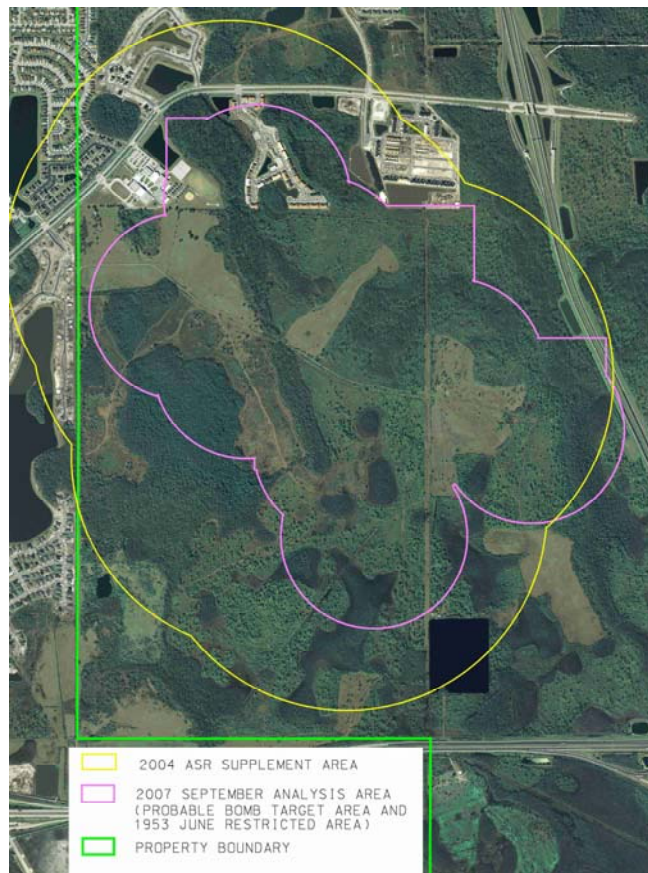


**MEMORANDUM FOR RECORD**

**SUBJECT:** September 2007 Analysis of Pinecastle Jeep Range (PJR) I04FL040501 Probable Bomb Impact Areas west of Highway 417

1. **Summary - 2007 Probable Bomb Impact Areas Analysis:** The US Army Corps of Engineers (USACE), St. Louis District reanalyzed the probable bomb impact area for the former PJR. We have determined the total Probable Bomb Impact Areas west of Highway 417 area should be 828 acres as represented in pink on the 2006 imagery below, as opposed to 1,544 acres as represented by the yellow polygon from the [2004 Archives Search Report \(ASR\) Supplement](#). The 828 acre area, which falls within the Formerly Used Defense Site (FUDS) boundaries, is based upon 1,400-foot radius site specific probable bombing impact areas centered around each of the eight identified bombing targets on the range west of Highway 417 ([MMRP SI MRS-04](#)) along with additional areas within the [18 June 1953 Restricted Area](#).



*Figure 1 – 2006 imagery with 2004 ASR Supplement Range Complex No.2 (yellow) and September 2007 Analysis Probable Bomb Impact Area (Site Specific Probable Bomb Impact Area and 1953 June Restricted Area) (pink); FUDS Boundary in green*

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This assessment is based on integrating and reanalyzing previously known and recently located archival data (including 1947 and 1953 ordnance clearance documents), an assessment of aerial photography from better historical imagery, and a refined assessment of probable bomb impact areas based on known site use. The extent of the probable affected area around each bomb target was determined from data developed during World War II. This data showed a direct correlation between altitude from which the bombs were dropped and final dispersion on the ground (i.e. the lower the plane, the smaller the dispersal). Demonstration exercises at PJR are known to have been flown at altitudes of 9,000 feet and lower. The numbered paragraphs that follow provide the details of this assessment.

2. **References:** This document makes reference to a number of documents that have been made available to the public through the [Jacksonville District PJR website](#). It primarily references the following two reports:

U.S. Army Corps of Engineers St. Louis District, [Archives Search Report \(ASR\) Findings Pinecastle Jeep Range I04FL040501, draft September 1997, final February 2002](#)

U.S. Army Corps of Engineers St. Louis District, [ASR Supplement, Pinecastle Jeep Range I04FL040501](#), November 2004

It also includes references to a number of historical primary source documents that have also been posted with applicable hyperlinks.

3. **Range Assessment Background:** The Senate Committee On Armed Services of the 106<sup>th</sup> Congress, 1st Session wrote [Senate Report 106-50](#), which directed the DoD to determine the UXO liability costs at all military ranges and provide a report to Congress. As a result, the Army issued a data call to inventory all military ranges, generally referred to as the Advanced Range Survey (ARS). In the fall of 2000, USACE, St. Louis District prepared an initial or Phase 1 assessment, including PJR, of Formerly Used Defense Sites (FUDS) properties that had a completed ASR completed. The DoD submitted the initial report reflecting the results of the cumulative ARS (including all services and FUDS properties) on 21 May 2001, to Congress.

In September 2001, the DoD established the Military Munitions Response Program (MMRP) within the Defense Environmental Restoration Program (DERP) in recognition of the requirements and the complexity posed at Munition Response Areas (MRA). In addition to defining the requirements for responses at its MRAs, the DoD established a requirement to identify, through an inventory, all locations other than operational ranges requiring a military munitions response. This necessitated a more refined or Phase 2 range assessment answer, which includes the ASR Supplements.

4. **2004 Probable Bomb Impact Areas Determination:** The ASR Supplement identified a Military Munitions Response (MMR) Area Range Complex No. 2 ([MMRP SI MRS-04](#)) based on a series of ten identified bombing targets associated with the [demonstration number 3-13](#)

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Tactical Air Force (TAF) Demonstration. Demonstration 3-13 was a regularly scheduled (monthly or bimonthly) exercise to exhibit tactics and display effects of weapons to observers on the ground; this included spraying them with water from chemical spray tanks while in route. The locations of the ten targets were based on: information in the ASR, interpretation of the available aerial imagery, and [January 1946 data for reconfiguring the Orlando Demonstration Range](#), another name for PJR, which was found during research conducted on other sites after the PJR ASR was completed. The ASR Supplement placed a 3,000 foot radius “range cell area” around each target location. It is a conservative default value used for ranges when many factors that affect targeting accuracy, such as altitude, flight speed, pilot experience were unknown. It was based on studies completed in WWII indicating 99 percent of the bombs should be found within 3,000 feet for bombers flying at 25,000 feet or below and at speeds up to 250 mph. The same study implied a 2,000-foot radius should include 95 percent of the bombs under the same conditions. The resulting 649 acre “range cell area” was a standard used in the ASR Supplements for most bombing targets including FUDS, BRAC and Active sites. As determining UXO liability costs was one of the prime drivers for completing the assessment, a conservative approach of including more area was deemed appropriate. Using the default figure did not take into account that the altitudes for demonstration number 3-13 were much lower (between 1,000 and 9,000 feet) and that experienced pilots were used. Also supporting a smaller probable bombing impact area from the [January 1946 reconfiguration of the Orlando Demonstration Range](#) is that the bleachers were placed approximately 1250 feet from the nearest target.

5. **Site Specific Circular Error Probable:** Circular Error Probable (CEP), or Circular Error Probability, for bombing is defined as the radius of a circle into which 50% of bombs dropped on a target will land. Data from contemporary World War II era military studies were used to determine a site specific probable bomb impact area at PJR based on Circular Error Probability for bombing. An appropriate CEP of 305 feet was determined by the Air Corps Board during the 1940-1942 time period (Study No. 45, Study of Bombing Accuracy Report Nos. 4-6). From the CEP, a series of circles can be generated to represent 68%, 85%, and 99% confidence levels. Two methods of analysis were used to determine radius for the 99% confidence level. The first method produced a radius of 915 feet. The second method resulted in a radius of 1,357 feet. A 99% confidence circle was calculated to be 1,357 feet for a level bomber at a 9,000-foot altitude flying at speeds no greater than 240 mph.

At the PJR, bombs are known to have been dropped from altitudes up to only 9,000 feet. Rounding upward, the St. Louis District has determined that a 1,400-foot radius “range cell area” or site specific probable bomb impact area is more applicable to the Demonstration Range of the PJR.

6. **1948 Aerial imagery:** Another element of this refined bombing impact assessment was the post-ASR acquisition of formerly classified Defense Intelligence Agency imagery from 1948. The imagery is at a very good scale of 1:5,600 (roughly 4 times better than other imagery) and is from shortly after the war. Analysis of this imagery allowed for increased visibility of ground

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features to delineate items of interest. Bulldozer scrapings of the specific targets, such as a convoy target, are clearly evident (see below)



*Figure 2 – extract of 1948 Imagery - Convoy Target (relocated); vehicle were aligned north-south but bulldozer scrapings of each vehicle location are east-west*

The aerial photographs were reviewed to identify areas of ground scarring and impact craters. These identified areas were then compared to the locations of possible use from the 1946 plan for reconfiguration of the demonstration range. In most instances the aerial photography confirmed activities in the vicinities of those specified in the historical documents. Areas of clear bulldozer scrapings, not associated with road construction, were categorized as a bomb target impact area, even if it did not correlate to other target information. Also, as in the case of the chemical demonstration area, the aerial photography does not show the concentric circles that were supposed to have been constructed. Analysis of the 1948 aerial photography resulted in identification of eight bombing targets in the area between the western boundary and Highway 417 (names based primarily on the [January 1946 reconfiguration plan](#); see figure 4 on page 6):

- 1) Ship Target
- 2) Convoy Target (relocated)
- 3) Warehouse Target
- 4) Tanks Target
- 5) High Explosion Impact Area
- 6) Airstrip Target
- 7) Convoy Target (original)
- 8) Square Target



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7. **1947 and 1953 Clearance Documents:** Subsequent to the ASR and ASR Supplement efforts, the St. Louis District located a series of deduinding documents for PJR at the regional archives in Fort Worth, while conducting research on other FUDS properties. These document included information on the clearance efforts at PJR in 1947 and in 1953. The details regarding the 1947 efforts are meager but do indicate a [clearance of 3 impact areas covering 12000 acres by the using agency](#). The items the clearance team found were M38A2 100# sand filled practice bombs, small arms firing and incendiaries. In [May 1947, the Savannah District](#) requested that the deduinding certificate be rescinded and the area reinspected by a specific Bomb and Shell Disposal Team (as opposed to the using forces). It also noted that Captain Keene of Bomb and Shell Disposal Team Detachment No. 8 felt some bombs may have been deliberately buried by bulldozer. It is unknown what subsequent efforts occurred but on 15 September 1947, Captain Keene signed a [certificate of deduinding for the Pinecastle Combined Demonstration Range](#), with the exception of a cross hatched area. A map of the cross hatched area from 1947 was not located but appears to be included in the later 1953 work (see below).

More detailed information is provided by a [10 April 1953 letter report](#) regarding an inspection that occurred on 7-9 April. A four man team from Engineer Range Clearance Team Detachment No. 8, SAD and SAJ met with George Terry of Magnolia Ranch for tour and inspection of Pinecastle Gunnery and Bombing Range. The report and [map identified 12 areas searched \(A through J, 1A and 1B; see figures 3 & 4\)](#) and what was found at each location including munition debris from practice, fragmentation and high explosive bombs, rockets, mortars, and smoke tanks.

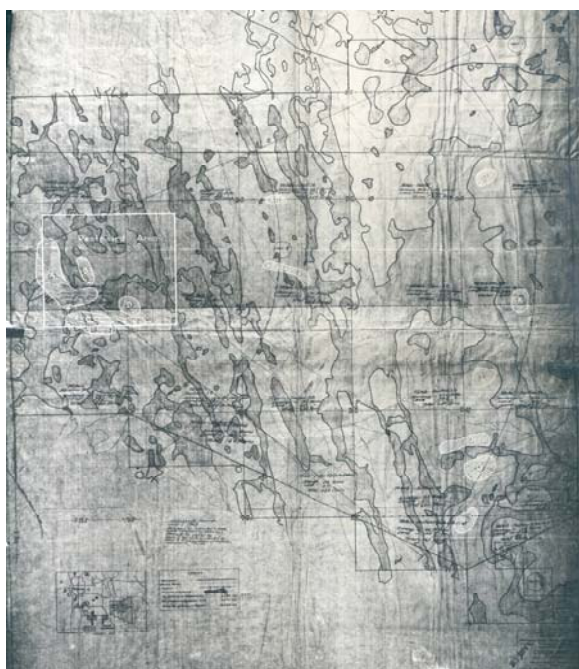


Figure 3 – [10 April 1953 Map annotations of areas searched with 1947 Restricted Area](#) (note: 1947 restricted area is white square annotation on left of 01 July 1949 Pinecastle Turret, Rifle and Air to Ground Gunnery Range, Pinecastle F.L.A., Cover Map base)

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The items found generally match the items noted as being used for the 3-13 TAF Demonstration during WWII. A [clearance team returned for 2 weeks in June 1953](#) to examine 768 acres within the 1947 restricted area. This resulted in a [reduced footprint](#) that would require an estimated 2 months with a full detachment to dedud.

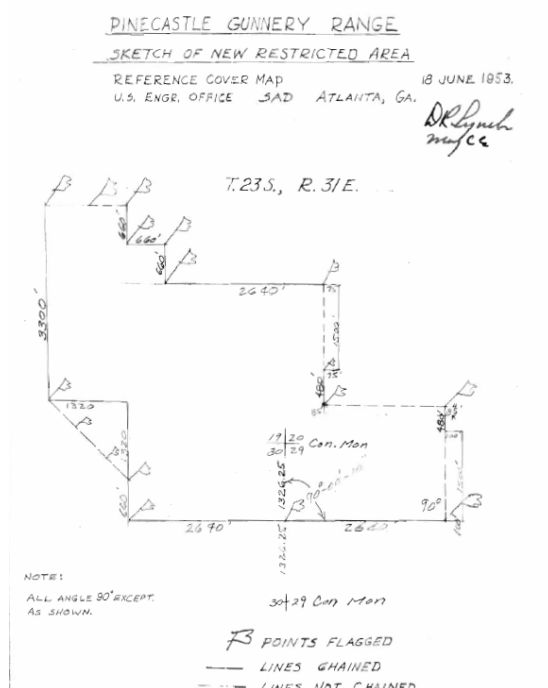
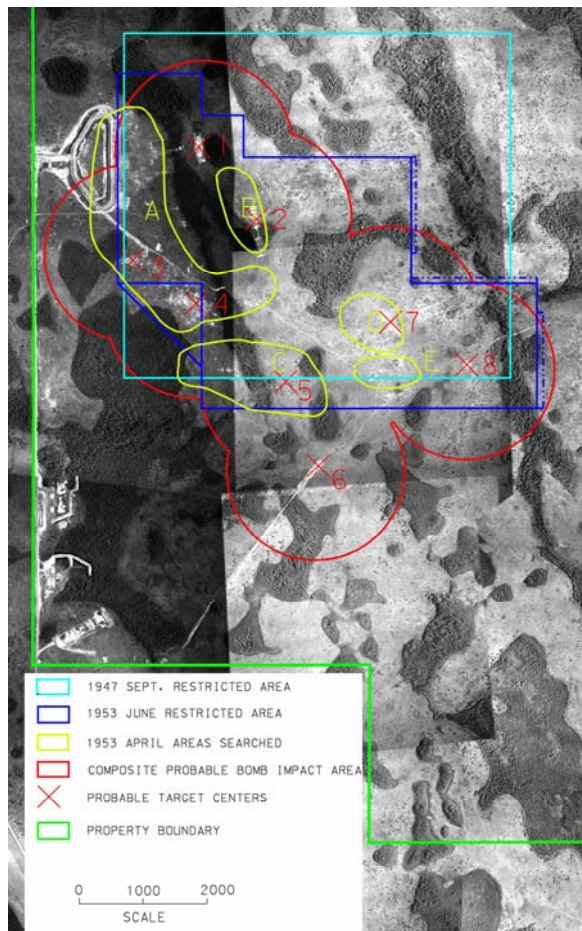


Figure 4 – [18 June 1953 Restricted Area](#) – footprint reduced from 1947

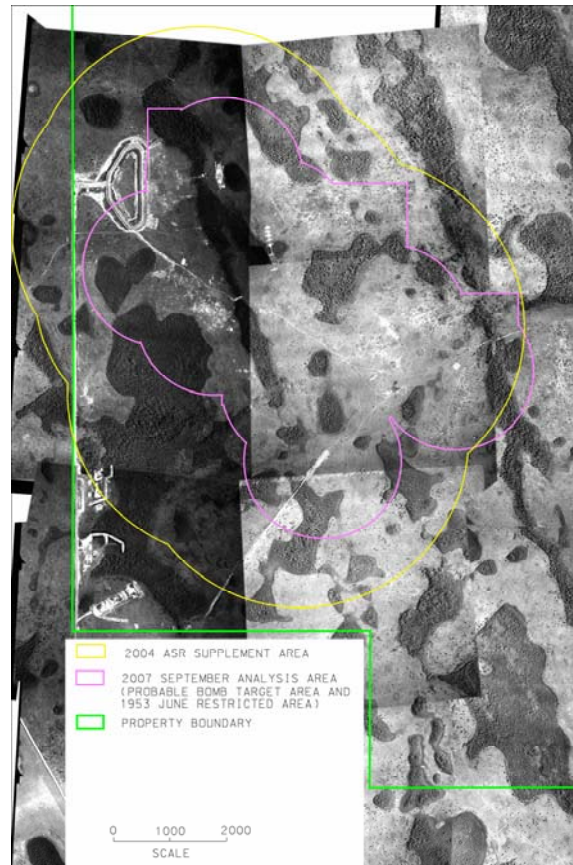
The [certificate of clearance issued on 14 October 1953](#) indicates the remaining areas are clear but that the areas within the boundaries be restricted to surface use only. Research to date has not determined if this recommended restriction was placed on the real estate title. Restricted areas are shown in light blue (1947) and dark blue (1953) in Figure 5 below.

8. **Conclusion Area west of Highway 417:** Figure 4 below shows the integration of the bomb targets as identified on the 1948 imagery with the 1,400 foot refined probable bomb impact area based on known lower flight altitudes and correlated to the surface use only restricted areas recommended following range clearances in 1947 and June 1953. Figure 5 is a less cluttered view comparing *this September 2007 Analysis Area (Site Specific Probable Bomb Impact Area and 1953 June Restricted Area)* it to 2004 ASR Supplement MMR Area Range Complex No. 2 ([MMRP SI MRS-04](#)).

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*Figure 5 – 1948 Imagery with clearance team restricted and searched areas and September 2007 Site Specific Composite Probable Bomb Impact Area*



*Figure 6 – 1948 Imagery with September 2007 Analysis Ordnance Impact Area (Site Specific Probable Bomb Impact Area and 1953 June Restricted Area) (pink) versus 2004 ASR Supplement Range Complex No.2 (yellow)*

9. **Recommendations for Area east of Highway 417:** The St. Louis District recommends conducting additional research and analysis during the upcoming Remedial Investigation / Feasibility Stage (RI/FS) phase of this project for the area east of Highway 417 to better delineate the probable bombing targets in that area.

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